MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

PPS0016 – INTRODUCTION TO PROBABILITY AND STATISTICS

(All sections/ Groups)

2 MAR 2016
2:30 P.M. – 4:30 P.M.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of SEVEN printed pages including the cover page.
2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.
4. Statistical table is provided.

Question 1

(a) The following data set shows the assignment marks (out of 10) for a sample of students in a group.

5.95 3.10 3.35 4.30 5.35 5.55 7.10 9.00 4.85 3.10

(i) Determine the mean and variance of the assignment marks.

[2+3 marks]

(b) The final exam results for a group 30 students from the Probability and Statistics class are recorded as below: -

45	99	58	94	62	95	74	94	74	86
84	61	81	69	57	93	97	80	97	73
74	50	76	60	77	67	92	54	92	98

(i) Construct a **frequency distribution table** using 40 as the smallest value for the lowest class. Use Sturges' formula to estimate the number of classes (round to the nearest integer). The table should also contain the class limits, class boundaries, midpoints, frequencies, the cumulative frequencies, midpoint times frequency(mf) and m^2f.

[8 marks]

(ii) How many percent of the students score B- and **ABOVE** if B- is ranging from 60 to 64?

[2 marks]

(iii) Sketch the **histogram**.

[5 marks]

(iv) Estimate the **mean** and **median**.

[5 marks]

Question 2

(a) A team of volley ball players consists of 9 members. How many ways can 6 players be chosen to represent the team for any game?

[2 marks]

(b) How many numbers between 2000 and 5000 can be formed with the digits, 1, 2 ,4 , 5 ,7 and 8 if each digit can only be used once.

[2 marks]

Continued ...

(c) Suppose that A, B, and C are three independent events such that P(A) = 1/4, P(B) = 1/3, and P(C) =1/2.

(i) Determine the probability that none of these three events will occur.

[3 marks]

(ii) Determine the probability that exactly one of these three events will occur.

[4 marks]

(d) A college sampled 280 male and 120 female students for a smoker or non-smoker survey. 70 of the male students and 20 of the female students are recorded as non-smoker.

(i) Construct a two-way classification table for the information provided above. Use the sample table given below:

	Male	Female
Smoker		
Non-smoker		

[4 marks]

(ii) Find the probability if a randomly sampled student is a non-smoker

[2 marks]

(iii) Find the probability if a randomly sampled student is a non-smoking male student

[2 marks]

(iv) Find the probability if a randomly sampled student is a smoker and given she is a female student.

[2 marks]

(v) Are the events 'non-smoker' and 'female student' mutually exclusive? Why?

[2 marks]

(vi) Are the events 'smoker' and 'student gender' independent? Why?

[2 marks]

Continued ...

Question 3

(a) A discrete random variable, X, denotes the number of customers visiting a restaurant per hour during the 7 days of festive season. Its probability mass function (pmf) is given as:

$$f(x) = 3cx^2, \text{ where } x = 1, 2, 3, 4, 5, 6, 7$$

(i) Construct a table to tabulate the pmf

[4 marks]

(ii) Find the value of c

[2 marks]

(iii) Find the value of $P(X \leq 4)$

[3 marks]

(iv) Find the value of $P(3 < X \leq 7)$

[2 marks]

(v) Find the expected value, μ of X.

[2 marks]

(vi) Find the variance , σ^2 of X.

[2 marks]

(b) Check whether each of the followings is a valid probability distribution.

(i) $f(x) = \frac{x-2}{4}$ for x = 1, 2, 3, 4, 5

[2 marks]

(ii) $g(y) = \frac{y+5}{9}$ for y = 2, 4, 6, 8, 10

[2 marks]

(iii) $h(z) = \frac{z}{15}$ for z = 1, 2, 3, 4, 5

[2 marks]

Continued ...

(c) If the probablity density function of a random variable is given by

$$f(x) = \begin{cases} 2x & 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

(i) Verify that the total area under the graph of probability density function is equal to 1.

[2 marks]

(ii) Find the probability that the random variable X is greater than 0.4.

[2 marks]

Question 4

(a) The probability of students passing the final exam of the Probability and Statistics is 0.9. If there are 5 students taking the exam for this semester:

(i) Determine the probability of exactly 2 students will pass

[2 marks]

(ii) Determine the probability of 3 or more students will pass

[2 marks]

(iii) Determine the probability of at most 1 student pass

[2 marks]

(iv) Find the mean and variance for this distribution

[2 marks]

(b) The lifespan of an air conditioner has an average of 10 years and a standard deviation of 2.0 years. Assuming that the lifespan of the air conditioner follows a normal distribution, find

(i) the probability that the mean lifetime of a random sample of one such air conditioner falls between 8.9 and 9.5 years

[6 marks]

(ii) the value of c such that $P(X > c) = 0.25$, where X is the average lifetime of the sample.

[6 marks]

Continued ...

(c) ABC University is running a student representative election. 55% of the student population are in favor of choosing Mr. Ali as the president. A random sample of 1000 students is selected for a suvey, and asked if they would choose Mr. Ali as the next president:

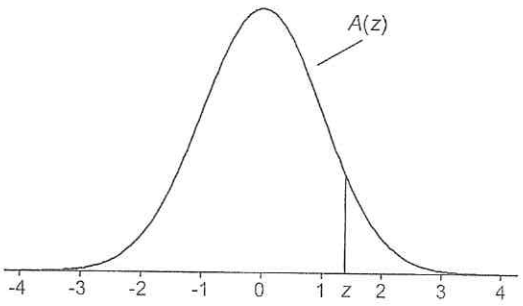
(i) What is the probability that less than half of those students would choose Mr. Ali?

[5 mark]

End of Page

TABLE A.1

Cumulative Standardized Normal Distribution



$A(z)$ is the integral of the standardized normal distribution from $-\infty$ to z (in other words, the area under the curve to the left of z). It gives the probability of a normal random variable not being more than z standard deviations above its mean. Values of z of particular importance:

z	$A(z)$	
1.645	0.9500	Lower limit of right 5% tail
1.960	0.9750	Lower limit of right 2.5% tail
2.326	0.9900	Lower limit of right 1% tail
2.576	0.9950	Lower limit of right 0.5% tail
3.090	0.9990	Lower limit of right 0.1% tail
3.291	0.9995	Lower limit of right 0.05% tail

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999							